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09/938,377	08/24/2001	Walid S.I. Ali	US 010194	1558

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BRIARCLIFF MANOR, NY 10510

EXAMINER

KIBLER, VIRGINIA M

ART UNIT	PAPER NUMBER
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2623

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DATE MAILED: 11/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/938,377

Applicant(s)

ALI, WALID S.I.

Examiner

Virginia M Kibler

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☒ Claim(s) 1-28 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 August 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. ____.  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date ____.   | 6) <input type="checkbox"/> Other: ____.                                    |

## DETAILED ACTION

### *Specification*

1. The disclosure is objected to because of the following informalities: “but the” should be changed to “but they” on page 3, line 6; “simulation ,” should be changed to “simulation,” on page 3, line 9; “such whether” should be changed to “such as whether” on page 11, line 5; and “order) , the” should be changed to “order), the” on page 16, line 21.

Appropriate correction is required.

### *Drawings*

2. The drawings are objected to because the subscripts and superscripts are not aligned with the equation in Figure 1D of the drawings filed 5/2/02. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled “Replacement Sheet” in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the

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examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Objections***

3. Claims 1-28 are objected to because of the following informalities: "information for ;" should be changed to "information;" in claim 1, line 8.

Claims 2-28 depend on claim 1, and are thereby objected to.

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 29 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 29 recites the limitation "said random set of metrics" in lines 16-17 and 19. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-5, 29, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolf et al. (US 6,496,221).

Regarding claim 1, Wolf et al. ("Wolf") discloses:

(a) receiving a video sequence for image quality evaluation 156 (Figure 11);

(b) providing an objective metric image quality controller comprising a random set of metrics 162 from  $M_1$  to  $M_n$  without cross correlation information (Col. 16, lines 56-67, Col. 17, lines 1-15);

(c) applying said each one metric of said set of metrics individually to said video sequence so that said each one metric of said random set of metrics provides an individual objective scoring value of said video sequence ranging from  $x_1$  to  $x_n$  (Col. 17, lines 16-67, Col. 18, lines 1-60);

(d) determining a plurality of sets of weights ( $w_1$  to  $w_n$ ) which correlate to predetermined subjective evaluations of image quality for a predetermined plurality of video sequences (n) (Col. 17, lines 49-67, Col. 18, lines 1-60);

(e) weighting by said each one set of weights each individual objective scoring value  $x_1$  to  $x_n$  provided by said each one metric of said random set of metrics in step (c) (Col. 17, lines 16-67, Col. 18, lines 1-60);

(f) adding the weighted individual objective scoring values of said random set of metrics into a single objective evaluation F, wherein each weighted individual scoring value from step

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(e) is multiplied by each individual objective scoring value  $x_1$  to  $x_n$  from step (c) (Col. 17, lines 16-67, Col. 18, lines 1-60);

(g) calculating a correlation factor R to provide a correlation value for the objective evaluation F and the plurality of video sequences (n) (Col. 17, lines 16-48; Col. 19, lines 8-38);

(h) repeating steps (e), (f), and (g) for each set of weights provided in step (d) to determine a plurality of correlation factors R (Col. 17, lines 16-48; Col. 18, lines 24-60);

(i) ranking said plurality of correlation factors R, wherein a particular correlation factor of said plurality of correlation factors having a particular correlation value closest to 1 represents a best ranking of the respective combined metrics in step (e) for each set of weights (Col. 17, lines 49-67, Col. 18, lines 1-60); and

(j) providing image quality information to at least one of a system optimizer and the video processing module as to the best ranking of the respective combined metrics obtained in step (i) to provide a best perceptual image quality (Figure 11; Col. 17, lines 16-27; Col. 18, lines 24-60).

Wolf discloses step (d) determining a plurality of sets of weights ( $w_1$  to  $w_n$ ) which correlate to predetermined subjective evaluations of image quality for a predetermined plurality of video sequences (n), but does not appear to expressly describe each one set of weights of said plurality of sets of weights being assigned a range having an incremental value equal to said range divided by a number of combinations for said each one set of weights. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the sets of weights disclosed by Wolf. The motivation for doing so would have been because it is well known in the art and depends on the statistical analysis used to optimize the metrics.

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Therefore, it would have been obvious to modify Wolf to obtain the invention as specified in claim 1.

Regarding claim 29, the arguments analogous to those presented above for claim 1 are applicable to claim 29.

Regarding claims 2-5, Wolf discloses step (f) is performed linearly (Col. 18, lines 7-40), but further discloses that it is known to use other statistics including applying a non-linear mapping function (Col. 17, lines 38-48). While Wolf does not expressly recognize using a quadratic model or polynomial degree for non-linear combination, it would have been obvious to do so depending on the number of metrics used. Furthermore, as Applicant indicates in the specification (Page 12, para. 1), one of ordinary skill in the art should understand that the present invention is not limited to a particular version of metrics, nor is it limited to the use of non-linear quadratic models. One of ordinary skill in the art would have expected Applicant's invention to perform equally well with either the model disclosed by Wolf or the non-linear model as claimed in claims 2-5 because they perform the same function of combining the metrics of the weighted individual scoring values into a single objective evaluation. Therefore, it would have been obvious to modify Wolf to obtain the invention as specified in claims 2-5.

Regarding claim 30, the arguments analogous to those presented above for claim 2 are applicable to claim 30.

8. Claims 6-8, 31, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolf et al. (US 6,496,221) as applied to claims 1, 2, 4, 29, and 30 above, and further in view of Corriveau et al. (4<sup>th</sup> Video Quality Experts Group Meeting, 13-17 March, 2000).

Regarding claim 6, Wolf discloses calculating a correlation factor  $R$  to provide a correlation value for the objective evaluation  $F$  and the plurality of video sequences ( $n$ ) (Col. 17, lines 16-48; Col. 19, lines 8-38), but does not appear to recognize using a Spearman rank order. However, Corriveau et al. ("Corriveau") discloses that it is known to use Spearman rank order correlation coefficient between objective and subjective scores (Page 3, lines 12-14). Wolf and Corriveau are combinable because they are from the same field of endeavor of video quality assessment. At the time of the invention, it would have been obvious to one of ordinary skill in the art to have modified the calculation of a correlation factor disclosed by Wolf to include using a Spearman rank order. The motivation for doing so would have been because it is well known in the art and provides a reliable method for determining the correlation coefficient between objective and subjective scores in order to select the most promising objective measures.

Regarding claims 7, 8, and 32, the arguments analogous to those presented above for claim 6 are applicable to claims 7, 8, and 32.

Regarding claim 31, the arguments analogous to those presented above for claim 5 are applicable to claim 31.

9. Claims 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolf et al. (US 6,496,221) as applied to claims 1 and 2 above, and further in view of Inazumi et al. ("Quality Evaluation Method Considering Time Transition of Coded Video Quality," IEEE 1999).

Regarding claims 9 and 10, Wolf discloses selecting a best set of weights from the plurality of sets of weights, but does not recognize using a genetic algorithm. However, Inazumi et al. ("Inazumi") discloses heuristically determining a best set of weights by a genetic algorithm



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that increases dynamically a size of the assigned range of each one set of weights and enables finding the best solution that maximizes the correlation factor of the overall objective image quality with the subjective evaluation without performing an exhaustive search to find the best set of weights (Abstract; Sect. 2.1-2.3 and 4.2). Wolf and Inazumi are combinable because they are from the same field of endeavor of video quality assessment. At the time of the invention, it would have been obvious to one of ordinary skill to have modified the parameter optimization disclosed by Wolf to include using a genetic algorithm. The motivation for doing so would have been because it is well known in the art and provides an alternative method to obtain the optimal weighted function. Therefore, it would have been obvious to combine Wolf and Inazumi to obtain the invention as specified in claims 9 and 10.

Regarding claims 11 and 12, the arguments analogous to those presented above for claims 9 and 10 are applicable to claims 11 and 12.

10. Claims 13, 14, 33, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolf et al. (US 6,496,221) and Corriveau et al. (4<sup>th</sup> Video Quality Experts Group Meeting, 13-17 March, 2000) as applied to claims 7 and 32 above, and further in view of Inazumi et al. ("Quality Evaluation Method Considering Time Transition of Coded Video Quality," IEEE 1999).

Regarding claims 13, 14, 33, and 34 the arguments analogous to those presented above for claims 9 and 10 are applicable to claims 13, 14, 33 and 34.

11. Claims 15-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolf et al. (US 6,496,221) and Inazumi et al. ("Quality Evaluation Method Considering Time Transition of Coded Video Quality," IEEE 1999) as applied to claims 9-12 above, and further in view of Eshelman et al. (US 5,390,283).

Regarding claims 15 and 16, Inazumi discloses heuristically determining a best set of weights by a genetic algorithm, but does not describe the details of the genetic algorithm. Since Inazumi was silent on the details of the genetic algorithm, it would have been obvious to one of ordinary skill in the art to look elsewhere for the specifics. Eshelman et al. ("Eshelman") discloses that it is known to use a genetic algorithm (Abstract) including a chromosome having a number of genes corresponding to quantity of plurality of sets where each gene is represented by a quantity of bits sufficient to represent all possible tested values for each one weight (Col. 9, lines 40-68, Col. 10, lines 1-31; Col. 11, lines 24-32). Eshelman further discloses using a genetic algorithm including altering a bit pattern of the chromosome by at least one of mutation and crossover (Col. 10, lines 32-68). Wolf, Inazumi, and Eshelman are combinable because they are from a similar problem solving area of parameter optimization. At the time of the invention, it would have been obvious to one of ordinary skill in the art to have modified the genetic algorithm disclosed by Inazumi to include the limitations of claims 15 and 16 taught by Eshelman. The motivation for doing so would have been because employing a genetic algorithm to search for optimal configurations is well known in the art. Therefore, it would have been obvious to combine Wolf, Inazumi, and Eshelman to obtain the invention as specified in claims 15 and 16.

Regarding claims 17, 18, and 20-23, the arguments analogous to those presented above for claims 15 and 16 are applicable to claims 17, 18, and 20-23.

Regarding claim 19, the arguments analogous to those presented above for claims 15 and 16 are applicable to claim 19. Eshelman discloses minimizing a deviation in the correlation

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factor so that a best solution comprises the deviation within a predetermined percentage of a predetermined value (Col. 10, lines 25-31).

12. Claims 24-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolf et al. (US 6,496,221), Corriveau et al. (4<sup>th</sup> Video Quality Experts Group Meeting, 13-17 March, 2000), and Inazumi et al. ("Quality Evaluation Method Considering Time Transition of Coded Video Quality," IEEE 1999) as applied to claim 13 above, and further in view of Eshelman et al. (US 5,390,283).

Regarding claim 24, the arguments analogous to those presented above for claim 15 are applicable to claim 24.

Regarding claim 25, 26, and 28, the arguments analogous to those presented above for claims 15 and 16 are applicable to claims 25, 26 and 28. Eshelman discloses minimizing a deviation in the correlation factor so that a best solution comprises the deviation within a predetermined percentage of a predetermined value (Col. 10, lines 25-31).

Regarding claim 27, the arguments analogous to those presented above for claims 10 and 26 are applicable to claim 27. Eshelman discloses the predetermined value comprises a value that cannot be reduced by further search (Col. 2, lines 15-27; Col. 10, lines 12-31).

#### ***Other Prior Art Cited***

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Pat. No. 5,446,492 to Wolf et al. for perception-based video quality measurement system;

U.S. Pat. No. 6,798,919 to Ali et al. for providing a scalable dynamic objective metric for automatic video quality evaluation;

Wolf et al., "Future Work Relating Objective and Subjective Telecommunications System Performance," IEEE 1991, pages 2129-2134;

Voran, "The Development of Objective Video Quality Measures that Emulate Human Perception," IEEE 1991, pages 1776-1781;

Wu et al., "Digital Video Quality Evaluation Using Quantitative Quality Metrics," IEEE 1998, pages 1013-1016 ; and

Winkler, "Visual Quality Assessment Using a Contrast Gain Control Model," IEEE 1999, pages 527-532.

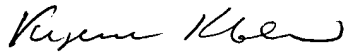
#### ***Contact Information***

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Virginia M Kibler whose telephone number is (703) 306-4072. The examiner can normally be reached on Mon-Thurs 8:00 - 5:30 and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Virginia Kibler can be reached on (703) 306-4072. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Virginia Kibler  
10/28/04

MEHRDAD DASTOURI  
PRIMARY EXAMINER

